Proposed Scope of Work for the US EPA Targeted Watersheds Grant

USEPA Targeted Watersheds Grant Program
FRL-7874-4
Implementation of Lake and Watershed Restoration Plan for
Lake Hopatcong, Sussex and Morris Counties, New Jersey

Nominated by:
Acting Governor Richard J. Codey, State of New Jersey

Submitted to:
Acting Administrator Stephen Johnson
U.S. Environmental Protection Agency

Submitted by:
Lake Hopatcong Commission
Borough of Mt. Arlington, Morris County
Township of Jefferson, Morris County
Township of Roxbury, Morris County
With additional participation by the Borough of Hopatcong, Sussex County

6 May 2005

The USGS cataloguing unit for Lake Hopatcong watershed is HUC 14: 02040105150020. Lake Hopatcong is listed as impaired for phosphorus and mercury on the New Jersey 2004 Integrated List, Sublist 5.

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ABSTRACT

Lake Hopatcong is New Jersey's largest inland lake (2,686 acres) with 38 miles of shoreline within the State's Highlands region. Lake Hopatcong is a major year-round recreational center for 500,000 annual visitors, and its watershed hosts a resident population of over 65,000 people in two counties and four municipalities. Lake Hopatcong has a phosphorus-based Total Maximum Daily Load (TMDL). The Lake Hopatcong Commission has received 319(h) funding to begin restoration of the lakes' water quality through aggressive stormwater retrofit and implementation. This proposal will provide further reductions in the phosphorus load and contribute toward achieving the targeted phosphorus loads as indicated in the Lake Restoration Plan. The Implementation projects outlined in this proposal will address stormwater contributions through the installation of additional BMPs, install innovative restoration measures that utilize iron oxide to inactive phosphorus, conduct aggressive public outreach measures, and will include a demonstration project for alternative wastewater treatment.

INTRODUCTION The United States Environmental Protection Agency (USEPA) is providing funding for the implementation of watershed management plans for the purpose of protecting and restoring the nation's waters. The USEPA has established a procedure for the nomination of potential projects and the subsequent review and ranking of successful nominations (Federal Register Volume 70, No. 33, pgs 8364 – 8372). The following is submitted by the Lake Hopatcong Commission (LHC), the State's appointed steward of Lake Hopatcong and its attendant watershed, in support of a nomination for the implementation of the phosphorus TMDL-based Restoration Plan, specifically developed for Lake Hopatcong and its watershed.

PROJECT DESCRIPTION Lake Hopatcong and its associated tributaries, Lake Shawnee and its subwatersheds, form the headwaters of the Upper Musconetcong River watershed, which drains into the Delaware River drainage basin. The lake is the largest inland waterbody in New Jersey (2,686 acres) and a premier recreational resource.

The lake's contribution to the regional economy is immense. Estimates developed in 2000 show the lake responsible, as a result of direct and indirect services, park user fees and property taxes, for the generation of over $10,000,000 annually in regional revenues. There are approximately 10,000 registered boats on the lake, and the Lake Hopatcong State Park has over 500,000 people visit or live in its watershed. Most of the visitors are from urban and inner-city areas.

A Total Maximum Daily Load (TMDL) was established for Lake Hopatcong and a Lake Restoration Plan was developed as a follow-up to the State's TMDL to provide detailed implementation measures to achieve the New Jersey Surface Water Quality

Standards (SWQS) for phosphorus in Lake Hopatcong, as well as attain the targeted phosphorus and ecological goals set forth by the TMDL. The outlet of Lake Hopatcong enters the Musconetcong River and drains into Lake Musconetcong approximately 1.28 miles from the Lake Hopatcong dam. Therefore, the implementation of the measures described in this project will provide water quality improvements for both lakes.

The LHC was created in 2001 by the Lake Hopatcong Protection Act (N.J.S.A. C58:4B). The LHC works cooperatively with governmental bodies and the public in the Lake Hopatcong watershed to monitor, protect and restore the lake and provide educational outreach on lake restoration efforts. The Commission consists of representatives from state, county and local governments, as well as local stakeholders.

A refined TMDL with an associated Lake Restoration Plan was developed as a means to quantify the specific loads on a municipal basis. Thus, each municipality has its own individual recommendations on how to contribute toward attaining the targeted goals of the phosphorus TMDL. The refined contributions of annual total phosphorus loading for Lake Hopatcong included surface runoff (31%) and septic systems (52%), with the remaining from the atmosphere and internal loading. A 319(h) grant was recently awarded to the LHC to initiate a portion of the stormwater implementation component of the recently revised and updated phosphorus TMDL for Lake Hopatcong. This 319 grant focuses on the implementation of several stormwater projects in the Borough of Hopatcong and one stormwater project in the Township of Jefferson, the two municipalities responsible for over 90% of the required phosphorus reductions for the TMDL. The LHC would like to continue to implement the recommendations of the Restoration Plan, based on the revised phosphorus TMDL.

In addition to implementing the findings of the TMDL, the LHC would like to implement some more innovative technologies to develop and quantify additional phosphorus reducing methodologies specifically adapted to post-development, urban / suburban conditions where the installation of large, conventional stormwater infrastructure is severely limited.

The LHC would also like to develop and implement a very pro-active, watershed-wide public outreach program to inform the stakeholders and visitors of Lake Hopatcong on the restoration efforts underway, as well as educate on what can be done, on an individual basis, to reduce the phosphorus load entering the lake. The public outreach program would establish and demonstrate the strong link that exists between phosphorus loading and in-lake water quality conditions. In turn, this relationship would be extended to economic impacts to provide a more holistic understanding on the need for watershed management. Another component of the outreach program would be training the Commissioners and operations staff on lake and watershed ecology, so they are better prepared in providing information and giving presentations to the public and/or media.

Since septic systems account for the largest portion of phosphorus entering Lake Hopatcong, a pilot investigation is proposed for assessing the potential feasibility and effectiveness of an alternative technology to standard on-site, individual wastewater disposal systems (i.e. septic systems). Thus, as part of this study, one community-based septic system would be "retrofitted" to be a peat field septic system. The Township of Jefferson accounts for the largest municipal based phosphorus load (58%) and the largest

portion of its load originates from septic systems. Thus, the site identified for this septic system retrofit is located within the Township of Jefferson, Morris County, NJ.

The Highlands Water Protection and Planning Act was adopted by the New Jersey Legislature on 7 June 2004. The Legislation set forth a comprehensive approach toward the preservation of the New Jersey Highlands for the protection of its water resources and environmentally sensitive areas. A significant portion of the Township of Jefferson is with the Highlands Preservation Area. One of the means established by this legislation to protect water quality is to withdraw sewer service areas from designated areas within the Core Preservation Area for wastewater collection systems have not already been installed. Lake Shawnee is a 50-acre waterbody located in the Township of Jefferson, in the upper northeastern portion of the Upper Musconetcong River watershed. The refined TMDL indicates that the outflow of Lake Shawnee accounts for 607 kg or 7% of Lake Hopatcong's annual TP load. The results of the proposed pilot study will be used to determine the potential feasibility and applicability of this alternative technology for future consideration, particularly for the community of 540 homes surrounding Lake Shawnee. Like many of the lake communities in New Jersey the surrounding homes have been converted to year-round residences, while most of the septic systems have not be upgraded or expanded to accommodate these changes. The majority of the homes in the Lake Shawnee area were built during the 1950's. As these homes are within the Highlands Core Preservation area and have existing septic systems that are, for the most part, older systems, upgrading to peat systems could provide a substantial water quality improvement for Lake Shawnee, which would also result in a decrease in phosphorus loading to Lake Hopatcong.

DESCRIPTION OF PROPOSED TASKS

Task 1 - Design and install additional stormwater BMPs in the Township of Jefferson, the Borough of Mt. Arlington and the Township of Roxbury. As mentioned above stormwater is an important contributing source of phosphorus for Lake Hopatcong. The refined TMDL determined that the stormwater load accounts for 2,466 kg (31%) of the lake's annual TP load. The LHC has already begun to address this issue through a 319(h) grant awarded to initiate stormwater implementation. This 319(h) grant focuses on the implementation of several stormwater projects in the Borough of Hopatcong (Sussex County, NJ) and one stormwater project in the Township of Jefferson.

The implementation of the 319(h) stormwater BMP projects combined with a sewering project underway within the Borough of Hopatcong will reduce the annual TP load targeted for reduction under the revised TMDL by 33%. The municipalities and the LHC have already identified additional specific project sites, as per the TMDL Restoration Plan, for additional TP reductions in the future. Thus, a large component of the proposed Targeted Watersheds Grant would continue these stormwater efforts through the design and installation of these previously selected stormwater BMPs.

The additional stormwater BMPs proposed for installation under the Targeted Watersheds Grant project include converting / expanding an existing detention basin to function as a wet pond and/or wetland basin (Roxbury Township) and the installation of two sub-surface sand filter BMPs (one in the Borough of Mount Arlington and the other in the Township of Jefferson).

Task 2 - Implementation and documentation of an innovative retrofit to enhance the capacity of existing structural BMPs to remove phosphorus. The stormwater BMPs identified for installation have been selected from the *New Jersey Stormwater Best Management Practices Manual* to ensure credit is received for the removal of phosphorus, as per the TMDL. However, the LHC would like to install sleeves of iron oxide in some of the installed BMP structures to document an enhanced removal of the stormwater-based phosphorus. In the presence of oxygen, iron strongly binds with phosphorus, making it unavailable for algal and aquatic plant growth. Thus, as part of this project, the LHC will compare BMP structures that do not have iron oxide sleeves to those that do and document the increased removal rates of phosphorus. This slight modification to installed stormwater BMPs could be an extremely cost effective means of enhancing phosphorus removal rates, in areas where the installation of large stormwater infrastructure is not an option (i.e. post-development conditions for urban and suburban lands).

Task 3 - Pilot Project on the effectiveness of peat biofilter treatment septic systems in lake communities. Since septic systems account for the largest portion of phosphorus entering Lake Hopatcong, a pilot investigation is proposed for assessing the potential feasibility and effectiveness of alternatives to standard on-site, individual wastewater disposal systems (i.e. septic systems). Thus, as part of this study, one community-based septic system would be "retrofitted" to be a peat biofilter treatment system.

Essentially, a peat biofilter treatment system is a conventional system with a layer of peat that accepts the effluent after it leaves the tank and before it enters the leachfields. The use of this type of system will provide a higher level of treatment where the potential

size and condition of a leachfield are severely constrained. Such systems have been demonstrated to be very effective in removing pathogens (i.e. bacteria), solids and nitrogen from septic effluent. In addition, such peat fields have a certain capacity to remove phosphorus as well. While data is limited, it appears that such systems can remove 30 to 40% of the incoming effluent's wastewater phosphorus. The LHC would like to conduct a pilot study to assess the potential phosphorus removal efficiency of such a system. As mentioned previously, Lake Shawnee accounts for 7% of the annual total phosphorus load entering Lake Hopatcong, and is within the Highlands Preservation area. Since sewering at this time is prohibited within the Core Area of the Highlands, there is the potential for innovative, alternative septic management solutions that will provide increased effectiveness for the reduction of Biological Oxygen Demand (BOD), fecal coliform, nitrates, suspended solids and phosphorus.

The proposed site for the pilot project is a Day Care Center that is on land owned by the Township of Jefferson. The Day Care Center is currently planning on expanding their operations. The current septic system is 18 years old and is a prime candidate for the study on the phosphorus removal efficiencies of these systems. As the operation of this on-site wastewaster system will have a usage of 65 people/8-hour day it will provide a sufficient amount of data on the use of these systems for larger than residential usage. The Day Care Center at this time uses bottled water for drinking. The Center had to install a chlorination tank due to fecal coliform contamination, and there have been problems associated with this chlorination tank. This would indicate that the system may not be functioning optimally at this time, and the pilot study would provide great benefits to the Day Care Center, while providing actual data on this innovative technology.

Guidance has been provided by the State of New Jersey (April 8, 2005) for approving alterations to existing and malfunctioning systems using Peat Biofilter Treatment Systems. The design and installation of the pilot study will be in accordance with these guidelines.

To measure the phosphorus removal efficiency of the peat biofilter treatment system, sampling wells will be installed and samples will be collected for analysis. The operations staff of the LHC will collect these samples.

Task 4 - Additional training and watershed monitoring of Lake Hopatcong. As part of the 319(h) grant, the operations staff of the Commission will be trained and certified to collect stormwater samples to quantify the phosphorus removal effectiveness of the BMPs that will be installed. Part of the proposed Targeted Watersheds Grant would be used to further enhance this program. Specifically, the operations staff will be trained to monitor and collect stormwater samples to assess the enhanced effectiveness of the iron oxide sleeves.

In addition to the collection of water samples, the staff will be trained on the identification and collection of aquatic plants that reside within Lake Hopatcong. The collection of harvested plant material, and their subsequent analysis for phosphorus, will be used to quantify how the mechanical weed harvesting program contributes toward the TMDL by removing phosphorus via aquatic plant biomass. By quantifying the amount of phosphorus removed per unit ton of harvested plant material, this in-lake management technique can be integrated into the lake's TMDL, further justifying its value.

Another component of the expanded training program for the operations staff of the Lake Hopatcong Commission will include the collection of groundwater samples.

Such sampling efforts will be required to document the relative phosphorus removal capacity of the alternative septic system technology (peat biofilter treatment system), described in the subsequent task.

Finally, Commissioners and/or staff can be trained and educated on giving public presentation on Lake Hopatcong, its watershed and the impacts of NPS pollution. Training would also include what local stakeholders can do to minimize their contributions to the NPS pollutant load. Such an approach would result in local stakeholders (Commissioners / staff) empowering other stakeholders (homeowner groups, school students) with information on Lake Hopatcong and the protection of its associated natural resources.

Task 5 - Design and implementation of a holistic public outreach program for the Lake Hopatcong watershed. A multi-tiered public outreach program would be developed that includes a series of presentations at public events, the distribution of educational material and the offering of workshops on NPS management to homeowner groups and schools. A substantial portion of the outreach material that would be distributed to the stakeholders has already been developed as part of past projects. However, an additional flyer would be developed to link watershed management to in-lake conditions, which in turn would be linked to local economic conditions. All of the material developed and distributed through this public outreach program would be made available through the Commission's website. The workshops will be presentations that either Commissioners or Commission staff could give on general lake ecology and NPS pollution. Such a highly interactive public outreach program would provide the information needed to

justify all of the watershed-based measures that are required to comply with the phosphorus TMDL.

Task 6 – Project Documentation and Submission of the Final Report. The LHC will oversee and manage the proposed Targeted Watersheds Grant. Princeton Hydro will be responsible for the technical management of the project, assisting the LHC and the municipalities in the completion of the tasks as described. The LHC will also be responsible for the fiscal management of the project.

As part of its project responsibilities, Princeton Hydro will formally document the completion of each task in the form of a final report, which will include discussion and digital photographs. The final report will also include an analysis of the storm water and groundwater data collected by the operations staff, which will focus on quantifying the phosphorus removal efficiency of each implemented restoration measure. In turn, these data will be used to document how these measures have contributed toward attaining the lake's targeted phosphorus loads, as per the TMDL. These data will also be compared to the in-lake water quality data that is collected by the LHC and Princeton Hydro to identify observed improvements throughout the lake.

The LHC will submit quarterly reports to US EPA providing updates and developments associated with the proposed project. Princeton Hydro will assist the LHC in the development of the quarterly reports from a technical perspective.

All of the tasks associated with this proposed project will be completed within a time frame of 24 months.

Table 1. BUDGET INFORMATION - EPA Targeted Watersheds Grant Program[1]

SECTION A - BUDGET SUMMARY			
Watershed Project, Activity or Work Plan Element	Federal	Non-Federal	Total
1. Design / installation of stormwater BMPs	$ 767,000	$ 173,000	$ 940,000
2. Iron oxide retrofits	$ 6,000	$ 5,000	$ 11,000
3. Pilot study of peat biofilter for septic systems	$ 53,000	$ 35,000	$ 88,000
4. Public outreach, training, monitoring and pro. Doc.	$ 32,000	$ 77,000	$ 109,000
Totals	$ 858,000	$ 290,000	$ 1,148,000

SECTION B - BUDGET CATEGORIES					
	Watershed Project, Activity or Work Plan Element				Total
Budget Categories	(1)	(2)	(3)	(4)	
a. Personnel	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
b. Fringe Benefits	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
c. Travel	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
d. Equipment	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
e. Supplies	$ 0.00	$ 0.00	$ 3,000	$ 0.00	$ 3,000
f. Contractual	$ 94,000	$ 2,000	$ 15,000	$ 27,000	$ 138,000
g. Construction	$ 673,000	$3,000	$ 35,000	$ 0.00	$ 711,000
h. Other	$ 0.00	$ 1,000	$ 0.00	$ 5,000	$ 6,000
i. Total Direct Charges (sum line a-h)	$ 767,000	$ 6,000	$ 53,000	$ 32,000	$ 858,000
j. Indirect Charges	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
TOTALS (sum line i-j)	$ 767,000	$ 6,000	$ 53,000	$ 32,000	$ 858,000

[1] Excerpted from Standard Form 424A, OMB Circular A-102